

CLAIMS

1. Method for the purification of a molten metal containing one or more foreign
5 elements, characterised in that the molten metal is cooled to a eutectic
temperature to simultaneously form purified metal crystals and crystals
containing at least one foreign element, and in that at least some of the crystals
containing at least one foreign element are separated from the purified metal
crystals by using a solid-solid separation technique.
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2. Method according to claim 1, wherein prior to the application of the solid-solid
separation technique at least some of the purified metal crystals and the crystals
containing at least one foreign elements are substantially simultaneously
separated from substantially the total amount of molten metal.
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3. Method according to claim 1 or 2, wherein the solid-solid separation technique is
executed by separating the purified metal crystals and the crystals containing at
least one foreign element into multiple fractions, wherein the ratio of the
concentration of the purified metal crystals and the concentration of the crystals
20 containing at least one foreign element in one of the fractions is higher than the
ratio thereof in the molten metal.
4. Method according to claim 1 or 2, wherein at least some of the crystals
containing at least one foreign element are separated from substantially the total
25 amount of molten metal containing purified metal crystals.
5. Method according to claim 3, wherein the solid-solid separation is executed
using centrifugal force.
- 30 6. Method according to claim 3, wherein the solid-solid separation is executed
using an electromagnetic field.

7. Method according to claim 3, wherein the solid-solid separation is executed using a floatation technique.
- 5 8. Method according to any of claims 5, 6 or 7 additionally comprising a subsequent solid—liquid separation step.
- 10 9. Method according to claim 4, wherein a layer of salt is brought into contact with a layer of the molten metal containing both the purified metal crystals and crystals containing at least one foreign element, and wherein means are used to transport at least some of the crystals containing at least one foreign element into the salt layer and at least some of the purified metal crystals are separated from the molten metal.
- 15 10. Method according to any of the preceding claims wherein the molten metal is aluminium.
11. Method according to claim 10 wherein the foreign element(s) comprise one or more of iron, silicon, copper, manganese and magnesium.
- 20 12. Method according to any of the preceding claims wherein the purified metal crystals and crystals containing at least one foreign element are formed and separated continuously.
- 25 13. Method according to any of the preceding claims wherein the molten metal containing one or more foreign elements is subjected to a fractional crystallisation process and a solid-liquid separation technique before the remaining molten metal is cooled to a eutectic temperature to simultaneously form purified metal crystals and crystals containing at least one foreign element.
- 30 14. Method according to any of the preceding claims wherein molten metal containing one or more foreign elements remaining after the solid-solid separation step is subjected to a fractional crystallisation process and a solid-liquid separation technique.

15. Method according to claim 14 wherein the molten metal containing one or more foreign elements remaining after the solid-liquid separation technique is subjected to a process according to claim 1.